*UPLanD – Journal of Urban Planning, Landscape & environmental Design, 8*(1), 31-42. [2024]

UPLanD
Journal of Urban Planning, Landscape & Environmental Design

Research & experimentation
Ricerca e sperimentazione

# Application of landscape ecology methodology in the project of Vulture Natural Regional Park

Emanuela Coppola, Silvana D'Ambrosio
*Department of Architecture, University of Naples Federico II, IT*

## Highlights

- To overcome a common issue for territorial parks: being entities that are often poorly recognized by the communities living within the territory.
- Landscape ecology is a discipline that studies the landscape and its spatial variations at different scales, considering both natural and human-altered ecosystems.
- The territorial project is an opportunity to create connections between the fragmented portions of the park and its surrounding natural territory through the implementation of multi-scale ecological networks.
- Designing a "network of networks" that relates all places with environmental qualities, even if differentiated, capable of triggering the necessary conditions for the design of a green-grey continuum.

## Abstract

The Regional Natural Park of Vulture is the youngest among the protected areas in Basilicata, located at the border with Campania and Puglia, characterized by a unique blend of geomorphological, vegetational, and historical-cultural aspects. The proposal about a park project aims at establishing and implement ecological, landscape, and multilevel environmental connections, focusing on identifying and enhancing green infrastructures to overcome the issue about portions of territory's fragmentation and its identity and statutory components. The project plan is based on the analysis and interpretation of various environmental and landscape components to understand the structuring elements and co-evolutionary processes of the territory, that have determined its current configuration. Environmental networks become the essential tool to define these multiscale and multidimensional connections to establish a combined system for the conservation and enhancement of natural and cultural resources, promoting local development processes. The technical-operational methodology is based on the notion of *Landscape Ecology*, integrated with a territorialist approach and interpretation planning. This approach involves studying the interactions between natural and anthropic ecosystems and their influences on ecological processes. This methodology is a cultural choice in the scientific coordination of the Natural Regional Park Plan Agreement.

## Article history

Received: February 19, 2024
Reviewed: March 18, 2024
Accepted: March 22, 2024
On line: March 27, 2024

## Keywords

Natural Park
Project
Ecological Connections
Environmental Networks
Green infrastructures


Email: emanuela.coppola@unina.it, silvana.dafne.dambrosio@gmail.com
ISSN online 2531-9906 | Open access article under CC-BY-NC-ND 4.0 International License

## 1. The Regional Natural Park of Vulture

The Regional Natural Park of Vulture emerges as a recently established protected area in Basilicata, designated as a park by the regional law in November 20, 2017. It owes its name to Monte Vulture (figure 1), an inactive volcanic complex dating back to the Pleistocene era, a unique case of an Apennines volcano in Europe. This volcanic structure has undergone various eruptive phases, both explosive and effusive, shaping the morphology of the area as it appears today. The evidence of these phases are two crater depressions currently occupied by two bodies of water: the Monticchio Lakes (figure 2). They testify the last phase of volcanic activity and are located within a caldera depression that was formed following a volcanic-tectonic collapse of the western part of the volcanic edifice. They are commonly known as the Small Lake and the Big Lake, full of biodiversity in flora and fauna, separated by a 200-meters land strip and fed by both meteoric and underground waters. The volcanic aquifer of Monte Vulture gives rise to a dense network of mineralized, non-mineralized and naturally carbonated springs of high quality, which constitute an important economic activity for the area with the presence of establishments such as Gaudianello and Toka. There are numerous fountains scattered throughout the territory and many localities that are distinguished by bearing in their name a particular reference to water. These springs are fed by rivers and streams that have been primary sites for settlement development over the centuries. Another peculiar place in Vulture, also related to the theme of water, is characterized by the San Fele waterfalls, formed along the Bradano River (figure 3). When it traverses the territory, the Bradano River undergoes changes in elevation, giving rise to extraordinary natural water features. Furthermore, this area is characterized by a rich biodiversity due to the variety of ecosystems and the different climatic zones caused by the changing altitudes that change within a restricted territory. This diversity gives rise to varied landscapes, fostering a high variety of plant and animal life. In addition to its natural richness, this place is also intertwined with a millennia-old history that begins from prehistoric times with the first human settlements, continues through the Roman period with residences and thermal villas, extends into the Middle Ages with castles and fortifications, some of which were residences of Frederick II, and includes the presence of monastic orders that initiated the construction of numerous monasteries and abbeys. Moving into more recent times, the area witnessed events of brigandage, with personality like Crocco the brigand, and Marchigian Lanari family who promoted an enlightened experiment in Monticchio Bagni. Nowadays there are many evidences still visible in the territory.

The Vulture Park project is an opportunity to deal with a common issue for territorial parks: being entities that are often poorly recognized by the communities living within the territory. It is necessary to overcome the conservationist vision of cultural and natural assets, which often leads to the implementation of an "insular" logic, especially for protected areas and parks, where only artistic and landscape excellences are considered worthy of protection. Instead, it is essential to evaluate the culture of territorial planning where the care and management of common assets concern the entirety of the territory. The territorial project becomes an opportunity to create connections between the fragmented portions of the park and its surrounding natural territory through the implementation of multi-scale ecological networks that play an essential role in determining ecological, landscape, and environmental continuity from the interregional level down to the local scale. The first step is to understand the original morphology of the places and the stratification of urbanization, which allow the implementation of a principle of redesign and systematization of paths, identity places, and public spaces connected by a network structure in order to reconstitute the identity of the territory, making it recognizable, and offering functional services and paths that develop, in the best way, the natural, historical-cultural, and agricultural-productive characteristics. The history and naturalness of the places, therefore, form the basis of the Park Project, intended both as an identity recognition and as the construction of tourist-hiking routes, some of which are already existing, partly in development, and to be realized (Coppola et al., 2023).





**Figure 1:** Monte Vulture. *Source: photo by authors.*

**Figure 2:** Monticchio Lakes. *Source: photo by authors.*

**Figure 3:** San Fele waterfalls. *Source: photo by authors.*

## 2. Landscape Ecology Methodology

*Landscape Ecology,* or the ecology of landscapes, refers to the study of interactions between ecosystems within a given territory and how these interactions influence ecological processes. This approach considers landscapes as spatially heterogeneous geographic areas consisting of different patches or interacting ecosystems, which include both natural systems - aquatic and terrestrial - and human-dominated environments, including agricultural and urban contexts. Particularly, a patches-corridor-matrix approach is employed to study landscape interactions and components. Corridors are classified as narrow patches that can serve as either connections or barriers and are important functional structures because they facilitate the dispersal of plants and animals throughout the territory (Haddad et al., 2003). The development and dynamics of spatial heterogeneity within the landscape are central themes in ecological studies, especially concerning the effects of conversions from natural systems to human-dominated areas such as agricultural areas or urban systems. If a natural habitat undergoes alteration, its composition and configuration change. This alteration is defined as fragmentation. Another related theme concerning conversion is the value of corridors connecting habitats. Across various parts of the globe, biodiversity is affected by interactions between climate change, landscape connections, and land use that can either block (barriers) or enhance (corridors) species existence (Opdam & Wascher, 2004). Therefore, landscape ecology emerges as a discipline that studies the landscape and its spatial variations at different scales, considering both natural and human-altered ecosystems. The main goals of this discipline, concerning the management of environmental systems, are:

- Conservation of biodiversity;
- Conservation and reorganization of agricultural areas;
- Restoration of degraded and abandoned areas;
- Improvement of living standards in urban and suburban areas and enhancement of interaction between natural environmental systems and anthropized settlements.

Linked to the landscape ecology scope and landscape planning is the “movement” towards the enhancement of "environmental networks". The ecological network must be integrated with the

network made by the cultural framework of the territory because it is intimately linked to the continuous evolution of the landscape. The convergence of these two assets goes beyond the ecological interpretation of the landscape itself, as a "system of ecosystems" (Gambino J., 2001). Thus, the term "ecological network" switches to the broader concept of an "environmental network" because the reality of territories is continually based on intertwining nature and culture. It involves not isolated directions but rather a system of a "network of networks" (Gambino R., 2006) connected both vertically (at local, regional, global scales) and horizontally with a multitude of different networks that encompass territories. Considering how ecological networks can counteract fragmentation and isolation of natural phenomena, which result in habitat loss and the risk of extinction, it is necessary to consider this skill to understand how ecological networks, at different scales, are connected to other networks.

### *2.1 The Green Infrastructure as Structural Project*

The key concept, linking these approaches to planning, is about network and connectivity, and its goal, tied to the concept of "multilayer landscape" (Coppola, 2023), is to <<organize, regulate, and manage the networks of natural and cultural landscapes through strategic open spaces to preserve ecosystem functions and provide benefits and advantages to communities>>[3]. Creating a network of open spaces involves starting from the study of the territory to understand and recognize all places that have environmental qualities, even diversified among them, but that can trigger the necessary conditions for the design of a green-grey continuum. The integrated design of grey infrastructure with green infrastructure becomes a primary step to define continuity of the green network, which can merge natural areas with urbanized ones. The "grey" elements such as bus lines, trams, and minibus will contribute to the broader functioning of the green infrastructure and, therefore, must be seen as integral parts of the network itself (Coppola, 2016). Greenways can be interpreted in various ways:

- urban riparian paths with the purpose of being part of a re-qualification program for degraded or abandoned parts of the territory;
- thematic paths for recreation, often about long distance, based on natural corridors as well as abandoned railway sites and other types of routes;
- ecologically significant natural corridors, usually along rivers or, less frequently, ridge-lines, to allow for wildlife movements, biological exchange, naturalistic studies, and hiking;
- scenic and historical routes usually along main roads or, less frequently, along waterways, with interventions to allow pedestrian access along the route or, at least, to set up parking areas;
- systems and networks of greenways, based on the natural morphology of valleys and ridges, but sometimes resulting from the assembly of canals and various open spaces, to create green infrastructure of municipal or regional initiative.

These greenways are seen as various network systems connecting significant places within a territory and can be considered as real urban sustainable infrastructures. Their purpose is not only to link fragmented portions of the territory in a strategic and sustainable perspective but also to restore and highlight the value of these areas to prevent their deterioration, improve their quality, and coordinate management strategies. The planning of a sustainable urban infrastructure aims to represent a methodological-operational approach to implement, safeguard, and enhance the green structural component of a landscape. It is also a way to rethink the city through the re-composition of its relationships with the landscape using the tool of environmental planning. The territory is not only made up of nodes or networks but also of places with their own identity. In relation to the diversity of places, their dynamics, their co-evolutionary relationships, evolutionary trends, and their conflicts can be understood. The need about network paradigm is linked to the essentiality of explaining the interactions between different places, linking seemingly separate facts and actions. Territorial systems are complex systems characterized by <<different and redundant networks of connection, rich in reciprocal relationships, but 'mutilated' too, and interrupted by barriers or discontinuities caused by territorial transformation processes that bring ecosystem fragmentation>> (Gambino, 2010).

### *2.2 The Historical Reading of Places: The Long-Term Structure of Territorialization Processes*

One of the initial and essential points of the Landscape Ecology process is historical reconstruction. Understanding what existed before allows for a





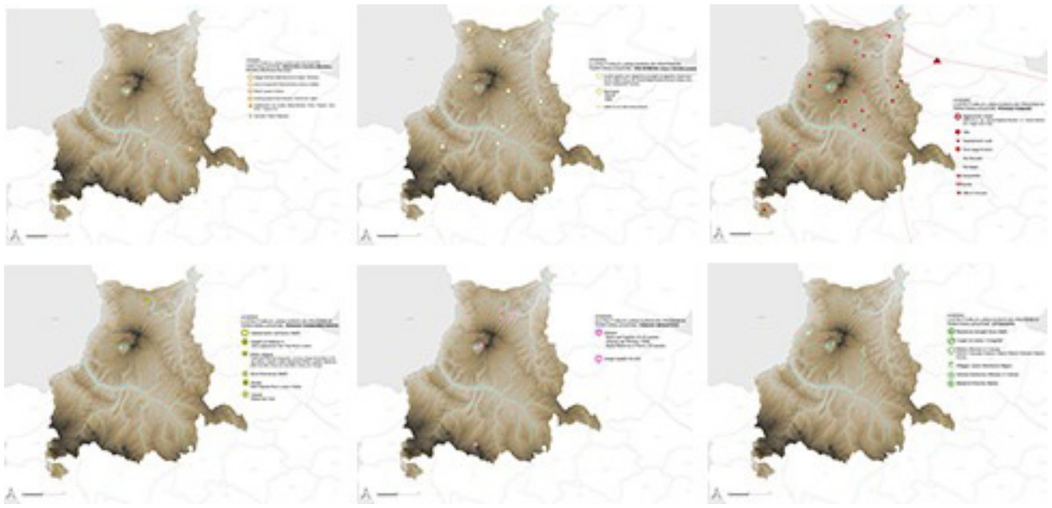

**Figure 4:** Historical Reconstruction: (from left) prehistoric period, archaic age, Roman period, Norman-Swabians age, Monastic period, nineteenth century. *Source: authors' elaboration.*

conscious and attentive design oriented towards the characteristics of the territory, not with the aim of "copying", but interpreting them and managing to bring them out in continuity and coherence with all the transformations that the territory has undergone, which have made it what it is today and therefore are also part of its history. However, operate nostalgically or as a radical ecologist is wrong. The imitation of nature never reaches the point of perfect reproduction of an original situation but rather studies and seeks to reproduce the set of ecosystem services (McHarg, 1969). First and foremost, the historical analysis of the territory's formation process is not aimed at the search for conservation of the "original nature" of the place but at the identification of its good reproductive practices that provide constructive, settlement, environmental, and relational rules to continue the work of territorialization according to innovative criteria and forms and to acquire virtuous relationships between human settlement and the environment to be used for the transformation project (Magnaghi, 2018). The identification of territorial identity is fundamental to initiate processes of re-territorialization. This identification requires reading the processes of territory formation in the long term to reinterpret their variants, permanences, material and cognitive sediments to produce new territorializing acts. Historical reconstruction will serve to highlight landmarks of the landscape and identify cultural assets to be "woven" into the new-defined green network. The analysis methodology will include both the development of a map of the historical structure that will highlight historical centralities (seen as historical centers and areas of archaeological emergence) and the identification of historical axes (Roman roads, historic roads, and traces of centuriation still present in the territory). Trying to proceed with a historical-identity reading of the places through texts, articles, cartographies, and historical maps, the first human settlements are noticed in the prehistoric period with the development of activities related to lithic industry and hunting. In the archaic age, the presence of peoples such as the Daunians, Samnites, and Lucanians was recorded, leaving behind scattered nuclei with huts, burial sites and industrial sites. During the Roman period, thanks to the presence of Venusia city, the Appian Way (Marchi 2019) and the Herculia Way were traced out of the necessity of connections with the rest of the empire, and along these routes, villas and villages arose. In the medieval period, there were successions of peoples including the Lombards, Byzantines, Normans, and Swabians, who started a great transformation of settlement patterns by establishing the *Casali* (De Rosa et al., 2021), whose aggregation pole was represented by a church, a monastery, or a castle. A notable example is the city of Melfi, which became the main Norman settlement for military organization, and where the construction of the castle began, which later became one of the residences occupied by Frederick II along with

the Lagopesole castle and the other one built in the north of San Fele, now unfortunately in total ruin. Concurrently, the phenomenon of "monasticism" should be mentioned, with the presence of Basilian and Benedictine monks who were responsible for the construction of the Sant'Ippolito Abbey and subsequently the San Michele Abbey, still today an emblematic place of Michaelic cult. Finally, in the nineteenth century, there were the birth of brigandage with the emblematic figure of Carmine Crocco and the beginning of an enlightened experiment made by the Lanari family, in Monticchio Bagni. It is also worth noting the phenomenon of the Grand Tour in this century, undertaken by the poet Edward Lear, which only concerned the Vulture area in the Basilicata region thank to its famous naturalistic and cultural connotations (figure 4).

### *2.3 From the urban bioregion of the territorialist approach to the concept of Interpretation Planning.*

The current relevance of the "Territorialist Manifesto" (Magnaghi 1990, 1998) places the concept of inhabiting the territory to the attention. Reference is made to the notion of the urban bioregion, which recalls Patrick Geddes bio-anthropocentric definition of the valley section (Saragosa, 2014), but theorized with a territorialist connotation in Italy by Magnaghi. The principal concept revolves around the connectivity of the regional ecological network. In the new dimension of the city and the information society, people inhabit a post-urban territory of vast area, where spatial relations are multi-scale. Activities and relationships have a variable, multidirectional, multi-temporal geography, with material and immaterial flows that radically alter the links between human settlement and the environment, between functional geography and places. An effective territory project can no longer foresee a clear separation between the historic city, rural village, and nature, but must pursue the redesign of urbanity, reconstructing its quality through new co-evolutionary relationships with agro-environmental spaces and degraded landscapes. The new geographic dimension of inhabiting is referred to the "urban regional" scale and the relationships between historic settlement systems, open public spaces, and their connective tissues. The urban bioregion is the concept where a territory project can be developed, integrating the economic components (referring to the local territorial system), political components (self-governance of living and production places), environmental components (territorial ecosystem), and habitat components (functional places and living spaces of a set of cities, towns, and villages) of a socio-territorial system to address the inherently "multi-scalar" issues posed by the need to (re)define potential co-evolutionary balances of relationships between human settlement and the environment and to produce a new eco-territorialist civilization.

*An urban bioregion is a local territorial system characterized by: a) The presence of a plurality of urban and rural centers, organized into reticular and non-hierarchical systems of cities, each connected in a synergistic, peculiar, and multifunctional way with its rural territory. These systems are interrelated with each other through residential, service, and production (both specialized and complementary) relationships; b) The presence of complex and differentiated hydro-geomorphological and environmental systems, related in co-evolutionary and synergistic forms with the urban and agroforestry settlement system. These co-evolutionary relationships, referred to at the scale of a watershed, a plain system with its valleys, a coastal system with its hinterland, and so on, characterize the quality and styles of living, the identity and heritage features, sustainable ecosystemic balances, and the self-reproductive capacity of a place* (Magnaghi, 2020).

Magnaghi proposes practicing ecological conversion through processes of re-territorialization by implementing the centrality of the territorial principle (a holistic approach in a synoptic vision): a path that, through the growth of place consciousness (awareness about the heritage value of territorial common goods, as essential elements for the reproduction of individual and collective life, both biological and cultural), can reinterpret the rules that have allowed the millennial construction of the territory as humanity's heritage and common good, adapting them to the future. The identification of territorial identity is essential to initiate processes of re-territorialization through the reading of long-term territorial formation processes to <<reinterpret variations, permanences, material and cognitive sediments in relation to which to produce new territorial acts>> (Magnaghi, 2022). The return to the territory emerges as an urgent reconstruction of material bases and social and productive relations to outline a new civilization based on renewed co-evolutionary relations between human settlement and the environment. However, the return to the territory is not an attempt to eliminate historical overlays to revive its original state. Humans can re-appropriate the territory not by continuing to protect it from their own actions but by reintegrating it into active cycles of production and reproduction of human life, establishing new territorial balances.

The Italian declination of landscape ecology's territorialist school is interpretation planning, which is a tool for understanding, dissemination, and planning of a territory strongly characterized by naturalistic, landscape, and cultural features. It is a methodological process aimed at defining enhancement strategies through the construction of an analytical, interpretative, and design process that highlights the identity and structuring peculiarities to create a network of connections between communities, experts, and the territory. This interpretative practice must be inserted within a regulatory framework, in this specific case, the Plan of the Regional Natural Park of Vulture, as it outlines constraints and directs the mode of enhancement to achieve the preset objectives: a) protect and conserve species and natural habitats, as well as enhance the geological, landscape, historical-archaeological, and palaeontological characteristics of the Park's territory, with particular reference to the environmental, geomorphological, and hydro-geological emergency represented by the volcanic lakes of Monticchio and Monte Vulture; b) protect native animal and plant species in the natural area, with particular reference to the Acanthobrahmaea europaea butterfly and species listed in the Annexes of the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC), as well as the beech forest of Monticchio located below 600 m a.s.l. due to the thermal inversion phenomenon, reconstructing and protecting the most threatened habitats and reintroducing species no longer present or endangered; c) implement the Conservation and Protection Measures provided for by European legislation (Habitats Directive and Birds Directive) and by Ministerial Decree 16 September 2013 in the SIC/ZPS areas falling within the perimeter of the Regional Natural Park of Vulture; d) organize the territory for use by an expanded audience (disabled, elderly, children) for cultural, scientific, educational, tourist, and recreational purposes, promoting initiatives to generate interest and respect for natural environments; e) promote sustainable development by reducing waste production through the activation of separate collection and the use or production of low-impact energy in line with PIEAR (Regional Environmental Impact Assessment Plan) (L.R. 8/2012) and rationalize the use of available resources (animal and plant species, habitats, soil, subsoil, water, agro-silvo-pastoral heritage, landscape), as well as promote socio-economic and cultural development in the area, through the enhancement of the territory and the development of eco-compatible activities, particularly eco-tourism, scientific, hiking, agro-silvo-pastoral, food and wine, and organic agriculture; f) develop actions aimed at implementing effective land maintenance, combating hydro-geological instability, and recovering degraded areas, also through hydraulic-forest arrangements with eco-compatible techniques and through the drafting of forest management plans as provided for by Regional Law No. 42/98 "Provisions on forestry"; g) promote scientific research in the Park's territory, respecting the needs for the safeguarding of the Park's naturalistic and environmental heritage; h) safeguard and enhance the traditions and anthropological aspects of the area, with particular reference to historical events linked to the phenomenon of brigandage, the figure of Frederick II, and the traditions of the Arbëreshë populations; i) safeguard and enhance historic centers and rural settlements (e.g., the Cellar Park of Barile), also through the recovery of maintenance culture and traditional crafts, for tourism purposes too; j) identify forms of facilitation for owners, tenants, and residents in the Park's territory, through the use of natural resources, in favour of employment; k) promote cultural activities for leisure time, in the safeguarding of lake and forest environments and in guaranteeing maintenance, combating any processes of abandonment; l) facilitate, also in the form of cooperatives, compatible productive activities, with particular reference to traditional artisanal and agro-silvo-pastoral production; m) promote and manage tourist, cultural, social, and sports services linked to environmental enjoyment and the enhancement of the relationship between humans and nature; n) contribute to the harmonious economic development of the entire territory. Therefore, the interpretative process within the plan follows the aims of active protection and is based on the construction of elaborates that give rise to a system of safeguards in which strategic actions can be developed and implemented.

The development strategy is based on the definition of an interpretation theme that can construct a "story" that characterizes the places starting from considerations on the landscape structure, the history of uses, and the evolution of the places' culture, on the intangible values present, on the local identities that the Plan assumes as elements to be protected

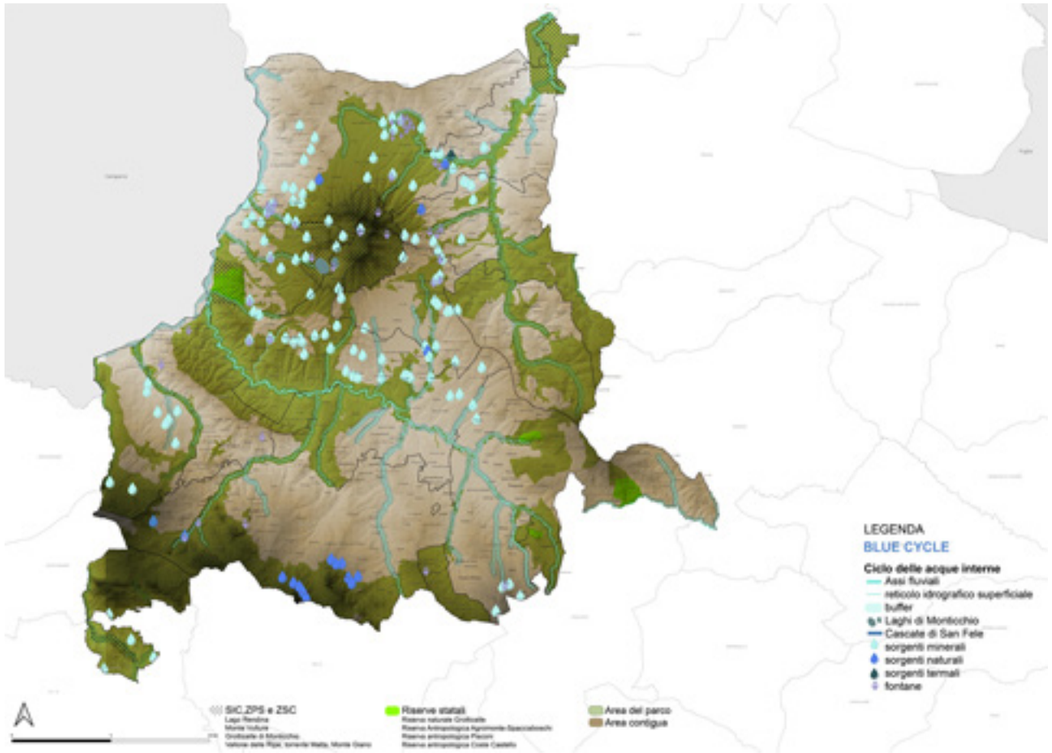


**Figure 5:** Blue Cycle. *Source: authors' elaboration.*

(Carta & Ronsivalle, 2018). The process starts, first of all, with the identification of the elements structuring the territory that express the identities of the places:

- elements structuring the ecological system;
- characterizing elements of the naturalistic and ecological heritage already recognized at regional and community levels, such as SIC and ZPS;
- territorial cultural components, such as assets listed and protected at the regional level and historic centers.

Following the identification of structuring components, the technique of life cycle analysis is applied. This technique, experimented and adopted within the Research Project 2010-11 entitled "Re-cycle Italy. New Life Cycles for Architectures and Infrastructures of the City and the Landscape", allows reading territories through some operating cycles:

- the green cycle, obviously predominant in the park system, where habitats and large areas with a strong "green" character have been selected and visualized;
- the blue cycle (figure 5), where key elements of the water cycle have been identified, such as springs, rivers and watercourses, and natural and artificial bodies of water;
- the red cycle (figure 6), containing the most important cultural resources, already recognized and identified;
- the brown cycle (figure 7) of production, where elements of productive contexts useful for the life and sustainability of park transformations (agricultural production areas) have been identified, as well as the urbanization system as a place of soil impermeabilization and elements that slow down the park's life cycles or constitute a limitation (oil installations, quarries, landfills, wind farms for electricity production, even in contextual areas).
- the grey cycle (figure 8) of territory infrastructuring, both for access to the reference territory and for penetration and use of the park; with particular attention to the existing trails, national cycle paths, and bike paths. Disused or underutilized railway lines that border the park territories are also indicated, which could be re-





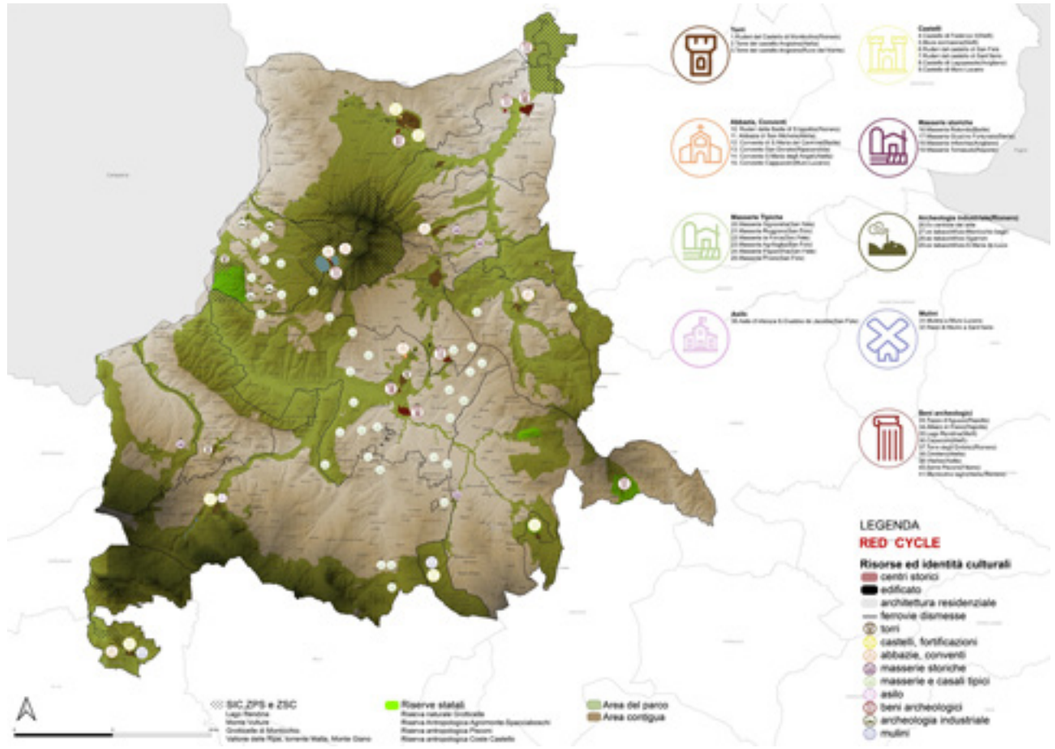


**Figure 6:** Red Cycle. *Source: authors' elaboration.*

activated or repurposed.

Interpretation, description, and representation of the values that make up the territorial heritage in the form of environmental, urban, landscape, and anthropic components are therefore the essential precondition for starting planning processes to distinguish between structural and statutory aspects and strategic and transformative aspects of the territory.

The structural interpretation of the territory passes through the distinction of structuring factors which are the characterizing elements that define the characteristics of local systems that make them recognizable and distinct from other structurally similar systems; qualifying factors, which give each system particular quality or added values (Gambino R., 2010), and criticalities, defined as such regardless of structure and characterization. Strategies must be implemented to save and improve the territorial capital and the systems of widespread values that structure the territory and reconstruct its identity image. Therefore, an innovative technical-operational methodology is implemented based on the territorialist approach and the ecological and functional connection of the most relevant anthropic and natural elements aimed at recognizing the relationships between the identity nodes of places, the development of society, and the modification of resource consumption behaviors and based on the interpretation of complex hydrogeomorphological, botanical-vegetational, historical-cultural, and perceptual aspects that find a synthesis in the recognition of qualifying aspects for the natural and anthropic system, where criticalities and territorial interferences have been investigated to propose solutions for landscape mitigation.

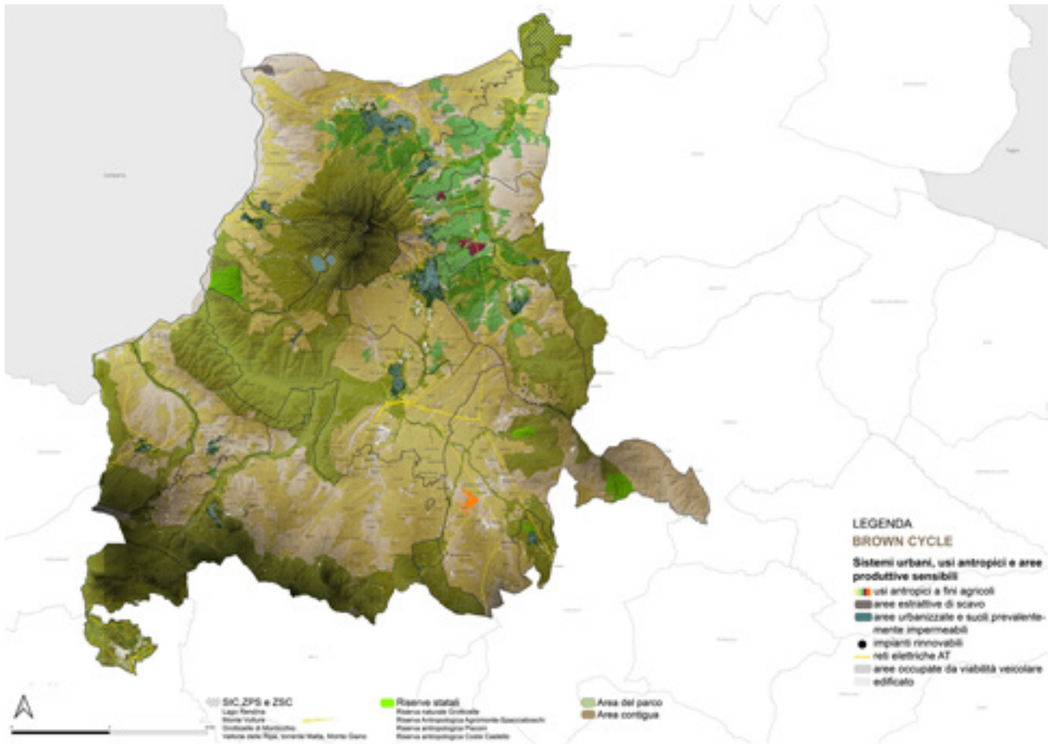


**Figure 7:** Brown Cycle. *Source: authors' elaboration.*

## Attributions and Acknowledgement

The authors jointly designed and contributed to the paper conceptualization. All the parts of this paper have been discussed and approved by all the authors. However: §§ 1 and 2 are by M.C., §§ 3, 3.1 and 3.3 are by B.C., §§ 3.2 is by S.R. and §§ 4 is by M.C. and B.C. Corresponding author: B.C.

The Agreement of the Regional Park Authority of Vulture with the LUPT Center of the University Federico II has Professor Marina Albanese as the Scientific Supervisor and Professor Emanuela Coppola as the Scientific Coordinator, with Mr. Ing. Carlo Gilio serving as the Technical Area Manager of the Park. The research groups include the following members: Professor Enzo Vinicio Alliegro (Anthropological aspects); Professor Marilisa Botte (Transportation aspects); Professor Massimo Fagnano (Agroecological aspects); Professor Angelo Fierro (Ecological aspects); Professor Riccardo Motti (Floristic-vegetational aspects); Agr. Antonio Di Gennaro (Physiographic and landscape aspects); Mr. Ferdinando Maria Musto (Geological aspects - GIS); Miss. Giusy Sica (Socio-cultural aspects); Mr. Marco Marotta (Territorial-ecological analysis in GIS environment); Mr. Antonio Santandrea and Miss. Silvana D'Ambrosio (Urban planning-territorial aspects); Urban junior Gerardo Prota (Intern for the Bachelor's Degree in PTUPA); Ivan Murano and Laura Ricoli (Interns for the Bachelor's Degree in SRT)





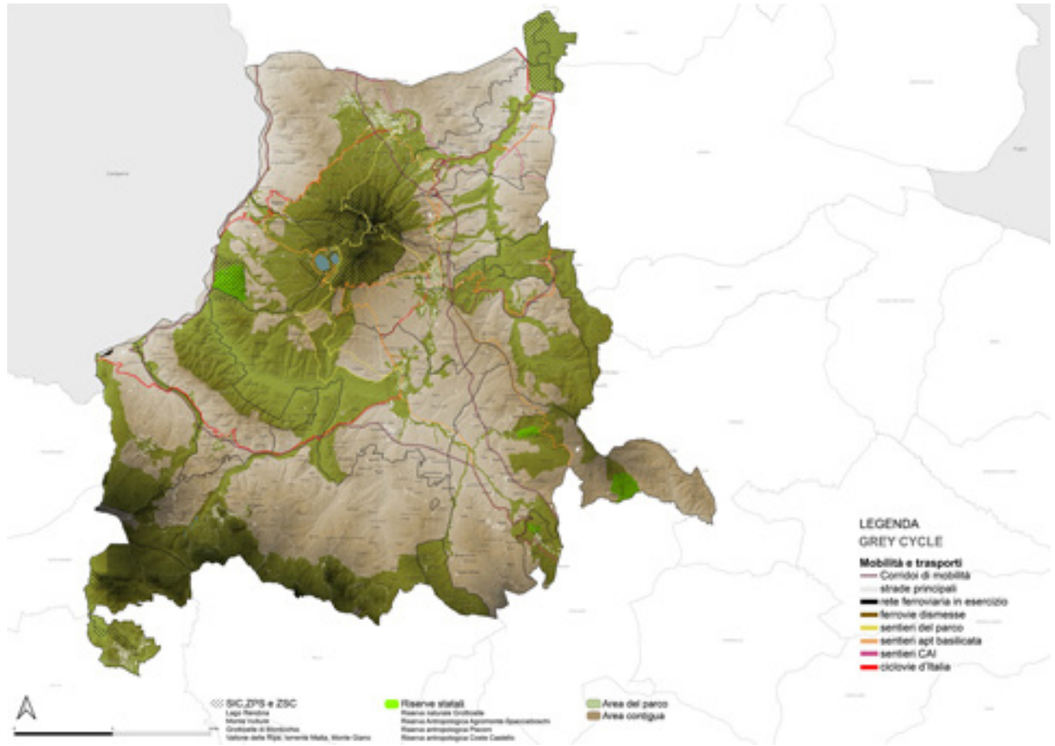


**Figure 8:** Grey Cycle. *Source: authors' elaboration.*

## References

Coppola, E. (2016). *Infrastrutture sostenibili urbane*. Napoli: INU Edizioni.

Coppola, E., Gilio, C., Mazza, A., & Musto, F. M. (2023), *Il progetto di territorio del Piano Naturale Regionale del Vulture,* in Atti della XXV Conferenza Nazionale SIU "Transizioni, giustizia spaziale e progetto di territorio/ Transitions, spatial justice and territorial planning" (publication in process).

Carta, M. & Ronsivalle, D. (2018). Tales from landscapes: interpretare i paesaggi del Parco dell'Appennino Lucano Val d'Agri Lagonegrese. In D. Ronsivalle (Ed.), *Luoghi, territori, paesaggi*. Milano:FrancoAngeli.

Clark, W. (2010). Principles of landscape ecology. *Nature Education Knowledge, 3*(10):34.

Gambino, J. (2001). La rete ecologica: il ruolo della geografia. *Bollettino dell'Associazione Italiana di Cartografia 111-113,* 67-85.

De Rosa, G., Cestaro, A., & Adamesteanu, D. (Eds.) (2021). *Storia della Basilicata 1. L'Antichità*. Bari: Editori Laterza.

De Rosa, G., Cestaro, A., & Fonseca, C. D. (Eds.) (2021). *Storia della Basilicata 2. Il Medioevo*. Bari: Editori Laterza.

De Rosa, G., & Cestaro, A. (Eds.) (2021). *Storia della Basilicata 3. L'Età moderna*. Bari: Editori Laterza.

De Rosa, G., & Cestaro, A. (Eds.) (2021). *Storia della Basilicata 4. L'Età contemporanea*. Bari: Editori Laterza.

Gambino, R. (2010). Parchi e paesaggi d'Europa. Un programma di ricerca territoriale. *Ri-Vista. Research for land-*

*scape architecture, 8*(2), 3-20.

Haddad, N. M., Bowne, D. R., Cunningham, A., Danielson, B. J., Levey, D. J., Sargent, S., & Spira, T. (2003). Corridor use by diverse taxa. *Ecology, 84*(3), 609-615.

Lear Edward, & Pepe, V. (2013). *Viaggio in Basilicata (1847).* Venosa: Osanna edizioni.

Magnaghi, A. (2020). *Il principio territoriale*. Torino: Bollati Boringhieri.

Magnaghi, A. (2022). *Il progetto locale. Verso la coscienza di luogo.* Torino: Bollati Boringhieri.

Marchi, M. L. (2019). *Appia Antica. La regina Viarum in Lucania dall'Ofanto al Bradano*. Venosa: Osanna edizioni.

Saragosa, C. (2014). Leggendo un classico. Il ritorno alla terra della città. Eutopia di Parick Geddes. *Scienze del territorio, 2014*(2), 477-480.